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(12) PATENT SPECIFICATION
ABSTRACT
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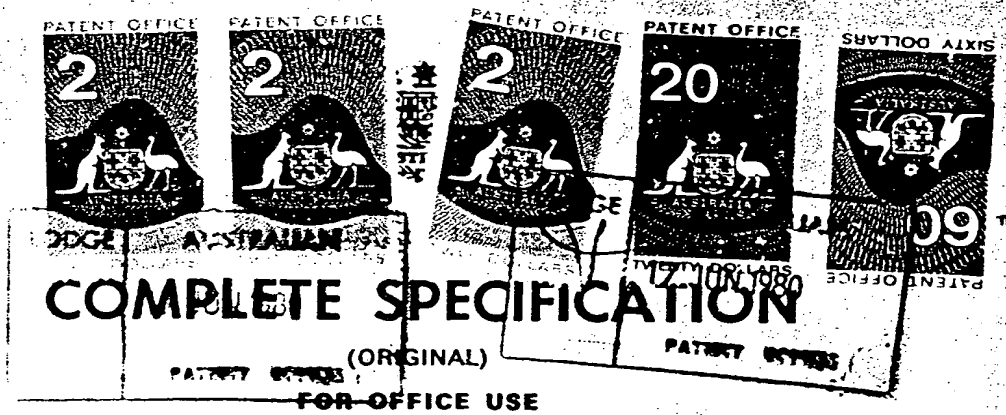
(43) 8.1.81
(51)[3] F16L 59/14 F16L 59/16 F16L 47/00
(54) Lagging pipe joints
(75) Williams, E.
(74) DJ
(57) Claim

1. A method for sheath lagging fluid-carrying pipe which comprises placing a shaped, annular [or hollow] preformed plug of thermally inert insulation material such as fibreglass within a length of tubular, and preferably synthetic plastics, sheathing material; gluing or otherwise securing the insulation plug to the inside surface of the sheathing, the sheathing and the plug being longitudinally split in alignment with each other along the length and along at least one side thereof whereby the insulated, split sheathing is adapted to be placed on site around joined pipework and the split edges then joined together.



COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

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TO BE COMPLETED BY APPLICANT

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Complete Specification for the invention entitled:

"PIPE LAGGING METHOD AND MEANS"

The following statement is a full description of this invention, including th best method of performing it known to me:—*

*Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 160 mm in width, on tough white paper of good quality and it is to be inserted inside this form.

12583/75—L

r. D. Atkinson, Government Printer, Canberra

This invention relates generally to service pipes for carrying fluids such as hot water, steam, gases and the like or refrigerant and which are to be placed above or below ground and are lagged and used in lengths to be joined on site and more particularly the invention is concerned with prelagged and/or sheathed sections of insulated pipe such as two inch copper pipe wherein the pipe forms a central core and a layer of insulation material such as foamed-in polyurethane surrounds the pipe and is contained within a sheath of plastic material and a length of pipe is left protruding so as to enable jointing by brazing, welding or the like.

When such insulated pipe sections are joined there is heat generated and also flames are present and the material is both flammable and toxic in terms of the fumes which are given off. Furthermore it is difficult to lag these joint sections with insulation and sheathing insofar as the lagging is not contiguous with the sheathing on both sides of the pipe join.

An object of the present invention is to provide methods for on-site lagging of lengths of fluid-carrying pipes and also for lagging sections of pipe at joins between lagged lengths or pre-lagged lengths of such pipes.

Another object is to provide means for on-site lagging of lengths of fluid-carrying pipes or for on-site lagging of sections of pipe at joins between pre-lagged lengths of pipe.

The invention according to one general aspect provides a method for lagging fluid-carrying pipe which comprises placing a shaped, annular [or hollow] pre-formed plug of thermally inert insulation material such as fibreglass

within a length of tubular, and preferably synthetic plastics sheathing material; gluing or otherwise securing the insulation plug to the inside surface of the sheathing, the sheathing and the plug being longitudinally split in alignment with each other along the length and along at least one side thereof, whereby the insulated, split sheathing is adapted to be placed on site around joined pipework and the split edges then joined together.

The invention according to another general aspect provides pre-insulated sheathing for lagging, fluid carrying pipes and prepared in accordance with the above described method.

The invention according to one form provides a method of pre-insulating and sheathing lengths of pipe in a factory, which are then suitable for transport to a site and the joining the pipe together and lagging the gaps left around the joined pipework by placing split insulated sheathing around the joined pipe and telescoping uninsulated but longitudinally split segments of sheathing as a sleeve or sleeves over interrupted lengths of sheathing adjacent to the pipe joint and then joining the sheathing along the split line.

The method and means of the invention is applicable to new installations and for maintenance, repairs or replacement of existing pipe lagging work and can be used for pipework and for conveying all types of liquids, whether hot or cold vapors, gases, or liquids.

According to a further aspect of the invention, the longitudinally split length of tubular sheathing material comprises one or more sections of pipe of synthetic plastics

material such as polyvinyl chloride with male jointing ends of the same diameter as in continuation of the pipe length and female jointing ends or faucets of wider diameter than the remainder of the pipe lengths and wherein the wider diameter jointing ends are adjoined to the narrower diameter pipe by integral intermediate flared or angled sections, the longitudinal slit of the pipe sheathing being off-set in the female portion to the male portion with respect to the longitudinal axis of the sheathing and joined by a slit at an inclined angle to the said axis so that both female and male or pipe-length portions of the flaps formed by the slits can be lapped for joining by gluing or other means.

In one modification of the above bell/spigot type jointing, the single longitudinal slit extends along the entire length of the sheathing between male and female ends and is at an angle which is inclined to the longitudinal axis of the sheath.

In a modification or variation of the invention applicable to the jointing of straight or uniform diameter pipe ends, there is provided a slip-on jointing sleeve or collar having a longitudinal slit and which is adapted to envelope two butting lagging sheath members. The jointing sleeve may be provided, along its lapped edge portions, with an indented or off-set profiled portion to enable flush-finished internal or external jointed surfaces. If desired, the lapped edges may be turned back to provide anchorages for fastening members such as clips for closing the slit of the sheath around insulated pipes.

In another variation of the method according to the

invention as applied to uniform-diameter lagged pipe sheathing with butting ends, there is provided on the external surface thereof a circumferential groove with an O-ring fitted adjacent the ends and a sliding, gluable collar component is adapted to be fitted over butting, joined, metal pipe ends which have been previously lagged with the insulated sheathing of the invention before arriving on site. This is accomplished by first sliding the collar back over one sheathed pipe end past the O-ring and then gluing the inner facing end of the collar to the sheathing and then sliding the collar back, before the glue has set, over the butting pipe sheathed end and also over the O-ring on the butting member to form an expansion joint.

Alternatively, external, circumferential grooves and sealing gasket O-rings may be replaced by a cylindrical sleeve which is a sliding close fit with external surfaces adjacent the ends of abutting pipe insulation sheaths, the sleeve being adapted to be glued onto the external surfaces of the sheaths.

In another variation suitable for joining the edges of longitudinally split sheaths and also those of covering sleeves, the edges are formed as mating male/female members comprising beading on one edge which interlocks with female grooving on another edge.

In the above form and modification of the method and means of the invention adaptable to linear pipe and lagging sheathing systems and fittings, the sheathing is preferably split by a single longitudinal slit and the sheathing and possibly also the insulation are both ringed

longitudinally in an oyster shell hinge arrangement.

In one modification of the above concepts or arrangements adaptable to non-linear pipe fittings such as elbows, bends, T-pieces and Y-pieces, the sheathing is preferably split longitudinally into two separate segments which are adapted to be joined together around pipe fittings of the non-linear type.

More,preferably, for elbows such as the "lobster back" type, the sheathing is split into radially tapered and split, inter sliding segments.

Some preferred embodiments of the invention will now be described with reference to the accompanying drawings in which:

Figures 1 to 18 on Sheets 1 to 3 show the first range of embodiments or first concept embodiment applicable to lagging of straight pipe lengths using narrow diameter or male ended sheathing ends and wider diameter or female ended sheathing ends.

Figures 19 to 36 on Sheets 4 to 6 show a second straight pipe embodiment using sheathing of uniform diameter ends.

Figures 37 to 43 of sheet 7 show a third embodiment adaptable as an expansion joint for straight, uniform diameter sheathing ends for butted pipe jointing.

Figures 44 to 51 of Sheet 8 show a hinged, split segment embodiment which is a modification applicable to non-linear pipe fittings.

Figures 52 to 61 of Sheet 9 illustrate variations of a different sheathing embodiment for the longitudinal split edge joining of linear split-sleeve sheathing by interlocking male/female joints.

Figures 62 to 65 of Sheet 10 show a further sheathing arrangement suitable for use around non-linear pipe fittings such as bends, elbows, T and Y pieces.

Referring in turn to each of the grouped arrangements of the embodiments of the invention, there is shown on Sheet 1, Figures 1 to 6 a lagging and sheathing method and means for hinged sheathing of a split, pre-formed plug 10 of inert insulation material such as fibreglass which is glued to the inside surface of the tubular sheathing of synthetic plastics material 11 and which has a single longitudinally split section 12 and openable at the plastic hinge 13 in an "oyster shell" arrangement. The sheathing has overlapping or lapped edge portions 14 on the narrower diameter or male part "M" of the pipe and wider diameter female part "F" of the sheathing. The slit and lapped portions on the male and female mating parts M and F are off-set and joined to each other through the inclined intermediate split 15. The edges of the sheath are joined by overlapping and then gluing the marginal portions around the slit as in 16.

In sheet 2, Figures 13 to 18 and Figures 13 in particular, the slit 17 is inclined to the longitudinal axis of the sheathing, but also runs along a considerable part of the total length of the sheathing to ensure proper jointing overlapping configuration.

In Figures 7 and 10 of Sheet 2, there is shown an embodiment suitable for jointing sheathing for straight lengths of pipe. Figure 10 is an assembled view of this concept.

Figures 11 to 18 of Figure 3 show a modification of the embodiment of Sheet 2, but wherein, as in Figur 13, the middle portion of the sheath slit 17, is inclined to th axis of the sheath.

Figures 19 to 24 on Sheet 4 show a three-piece sheathing system for straight pipe joints of uniform sheathing diameter using overlapped, straight-slitted edges and a central joining collar or sleeve 18. This sleeve is itself in the form of a longitudinally slit sheath member, but without a pre-formed insulation plug of fibreglass adhered thereto. The sleeve is glued to the glued, lapped, butting sheath sections.

In Figures 25 to 28 on Sheet 5, the sheathing has one lapped edge indented so as to provide a flush overlapped internal surface 19 or external surface 20.

In Figures 29 to 38 on Sheet 6, there is shown a jointing sleeve 21 suitable for jointing on-site, pre-lagged and pre-sheathed lengths of pipe ex-factory and, in addition to overlapped longitudinal joining seams. in Figure 30 th re is shown in broken outline a plug of insulation material which is conveniently used to fill in gaps between butting, pre-sheathed [and pre-insulated] lengths of pipe as in Figure 29F. There is shown in Figures 36 and 37, turned out edges join d by clips 22 and 23 or mating flanges 24 and 25 in Figure 34 joinable by a bolt. Figure 38 shows sheathing split into two half segments, referred to in more detail with respect to the description of the embodiments of Figures 52 to 57 of Sheet 9. Figures 39 to 44 of Sheet 7 show an embodiment

adaptable for use as an expansion joint and in this embodiment the sheathed lengths of lagged pipe are of uniform diameter and the end portions of each sheath are provided with grooves which provide a circumferential seating for O-ring seals 26. A coupling sleeve 27 having inwardly flared end 28 and outwardly flared end 29 is designed to be slideably fitted over the sheathing as a sleeve and jointing or lagging is effected by first sliding the sleeve back over the sheathing member M1 after having applied glue either to the inside flared-in rim of the sleeve or to the outside of the sheathing around the circumferential region where the sleeve is to be placed and then moving the butting pipe-sheathing segment M2 into position and then sliding the sleeve back over the segments M1 and M2 to effect a seal allowing longitudinal movement of pipe sheathing during expansion and contraction. Figure 43 shows a cross-section of an insert which is placed into the gap between sheathing members M1 and M2 prior to being covered by the coupling sleeve 27 . Figure 44 is a cross-section of M1 or M2 which are preformed into any length.

In the embodiment shown in the modification of the invention in Figures 45 to 52 on Sheet 8, the sheathing is split into longitudinal half segments for placing around non-linear pipe fittings such as bends, elbows, T and Y pieces and the like with lapped joints of male pipe or sheathing ends denoted M and female jointing ends designated F having lapped seams 30,31 and 32.

The embodiment of the invention shown in Figures 52 to 57 of Sheet 9 [with variations] in Figure 55 is suitable

for use in joining butting ends of cylindrical sleeving with a sleeve in a similar manner to the embodiments of Figure 19 [Sheet 4] and Figure 25 of Sheet 5, but in this embodiment, the longitudinal edges along the split line as in Figure 38 of Sheet 6 where the sheath is split into two, the two abutting sheaths S1, S2 also the edges of the collar C are formed with interlocking means in the form of a male beading and female grooves seen more clearly in the enlargement in Figures 55 to 59 which can co-operate to form a snap-fit seal eliminating the necessity for glue. Referring to the specific arrangement of Figure 55, the male portion 100 of the snap-fit seal is formed as beading with a lead-in part, that of Figure 56 has a spreader head 101, Figure 57 has an arrow-head spreader head 102, while the groove of the female portion has beading 103 on each side and a rubber seal 104.

In Figure 58 fitment of the raised bead 105 of the uppermost or male portion of the interlocking members is assisted into the complementary-shaped female member by the longitudinal central slit 106.

Figure 59 illustrates a thickwalled version of the interlocking members suitable for use in thin-walled sleeving and in this version the male section fits into a female section which has half round shoulders 107, the wall thickening 108, is internal or facing into the bore of the sheathing. If desired the wall thickening may be external to give a uniform internal bore. Figures 60 and 61 illustrate two modes of closure of the split sleeve insulation sheathing employing any one of the male/female snap-fit clips of

Figures 55 to 59. The closed up or sealed arrangement of Figure 60 is adapted to a sheathing in which two separate split shells are snapped together along their longitudinal edges 109, 110. Figure 61 shows open sheathing sleeve split along one longitudinal edge only, the other being formed as a thin longitudinal web into a plastic hinge 111.

It will be appreciated that in all of the foregoing sheathing arrangements, the snap-fit jointing is a permanent or "once only" closure action for applications not requiring any quick dismantling of the sheathing. If desired, thermal welding of the join may also be used by melting of the plastics material or Polyvinyl chloride glue may be used for a seal.

On Sheet 10 of the drawings the same [non-overlap], snap-fit sheath edge jointing arrangements shown in Figures 55 to 61 [Sheet 9] may be incorporated in further non-linear type fittings shown generally in the Figures 62 to 69 of Sheet 8. In the particular arrangement shown in Figure 65 which features a "lobster back" type bend, full insulation sheathing is achieved by end butting and edge locking together the two separate members 200 and 201 and then fitting the split outer sleeve comprising [in this illustration] radially tapered sleeve segments a,b,c,d and e which are preferably manufactured and sold in breakaway units and also as telescoping units. Alternatively and if desired, the jointing sleeve can be a continuous length and cut to size.

It will be apparent that a wide range of materials may be used for the components and although fibreglass has

been given as a preferred material for the insulation, it is obvious that asbestos, rock wool or other materials can be used as pre-formed insulation plugs and even foamed rubber or plastics can be used if preformed plugs and not foamed in. It may be feasible to have the insulation and sheathing pre-formed as an integral unit of foamed rubber or plastics or already formed or placed around lengths of pipe in a factory for transport to and installation on site.

In a variation of the edge jointing technique suitable for jointing two butting male [or uniform diameter] pipe ends, a circumferential male beading on the end of one pipe is snapped into a correspondingly shaped, female circumferential groove or channel on the end of the other pipe in manner similar to the embodiment of Figures 55 to 59 of the sheet 9 of the drawings.

The claims defining the invention are as follows:

1. A method for sheath lagging fluid-carrying pipe which comprises placing a shaped, annular [or hollow] preformed plug of thermally inert insulation material such as fibreglass within a length of tubular, and preferably synthetic plastics, sheathing material; gluing or otherwise securing the insulation plug to the inside surface of the sheathing, the sheathing and the plug being longitudinally split in alignment with each other along the length and along at least one side thereof whereby the insulated, split sheathing is adapted to be placed on site around joined pipework and the split edges then joined together.

2. A method according to claim 1, wherein joinable lengths of pipe are pre-lagged at a factory with a joinable length protruding from each end of the lagged lengths, the pipe lengths are joined by welding or brazing and a pre-insulated, sheathed split edge, jointing plug is placed around the joined pipe in the gap between butted joined pipe with an insulated central portion of the sheath in the gap between butted joined pipe and lagged ends, the plug edges are joined and inner surfaces of uninsulated sheath ends of the jointing plug are glued to outer surfaces of the sheaths adjacent the butted joined ends of the pipe.

3. A method according to claim 1 or 2 wherein external, circumferential grooves and sealing gasket O-rings may be replaced by a cylindrical sleeve which is a sliding close fit with external surfaces adjacent the ends abutting

pipe insulation sheaths, the sleeve being adapted to be glued onto the external surfaces of the sheaths.

4. A method according to any one of claims 1 to 3 wherein longitudinally split edges of the sheath are joined by overlapping and gluing and the sheaths are provided with means for limiting the depth of overlap.

5. A method according to any one of claims 1 to 3, wherein the edges are formed as mating male/female members comprising beading on one edge which interlocks with female grooving on another edge.

6. A method according to any one of claims 1 to 5 wherein the pre-insulated sheathed pipe lagging when installed is of cylindrical configuration and is longitudinally split along the entire length of one side and diametrically split to form a hinged "oyster shell" arrangement.

7. A method according to any one of claims 1 to 5 wherein the pre-insulated, sheathed pipe lagging is of cylindrical configuration when installed and is longitudinally split along the entire length of two sides.

8. Preformed, insulated lagging sheathing substantially as hereinbefore described with reference to Figures 1 to 18 of the drawings.

9. Preformed, pre-insulated, lagging sheathing for pipework substantially ashereinbefore described with reference to Figures 19 to 28 of the accompanying drawings.

10. Preformed, pre-insulated, lagging sheathing for pipework substantially as hereinbefore described with

reference to Figures 29 to 33 of the accompanying drawings.

11. Preformed, pre-insulated, lagging sheathing for jointed, linear pipework substantially as hereinbefore described with reference to any of Figures 34 to 37 of the accompanying drawings.

12. Preformed, pre-insulated, lagging sheathing for jointed, linear pipework substantially as hereinbefore described with reference to any one of Figures 39 to 44.

13. Preformed, pre-insulated, lagging sheathing for jointed non-linear pipework substantially as herein before described with reference to any one of Figures 45 to 51 or 62 to 69 of the drawings.

14. Preformed, pre-insulated, lagging sheathing for jointed, non-linear pipework substantially as hereinbefore described with reference to any one of Figures 52 to 61 of the accompanying drawings.

DATED, this 15th day of June, 1989

EDWARD WILLIAMS

by his Patent Attorney:

JOHN L.DAVIES & CO.

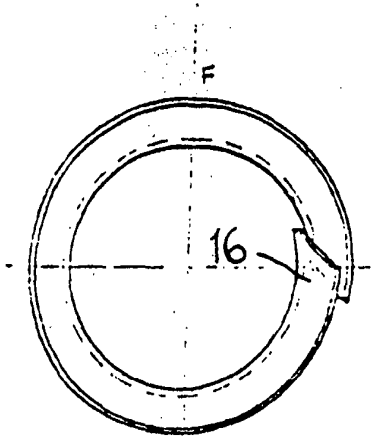

Fig 2

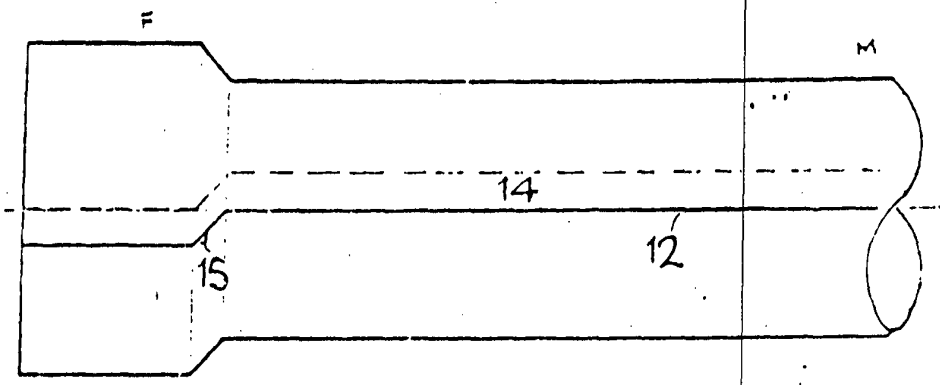

Fig 1

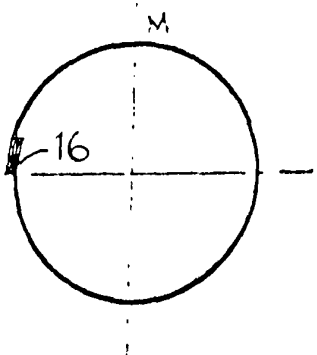

Fig 3

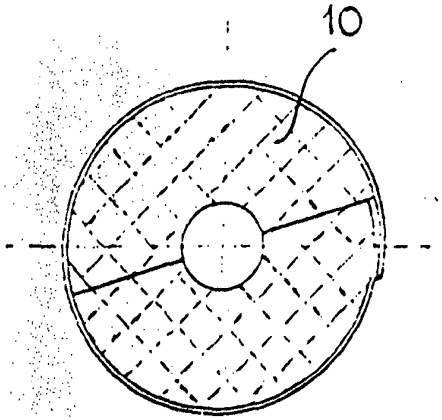

Fig 4

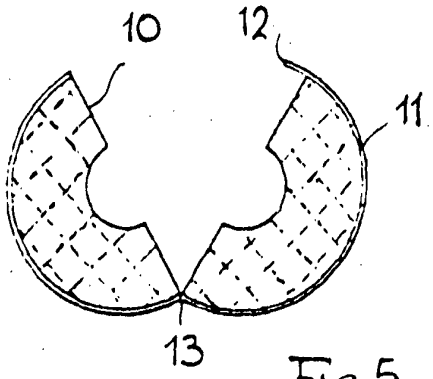

Fig 5

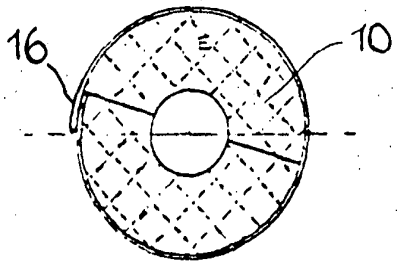

Fig 6

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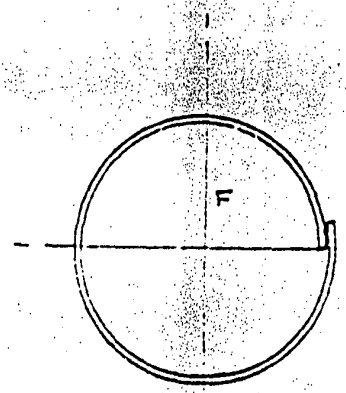

Fig.8

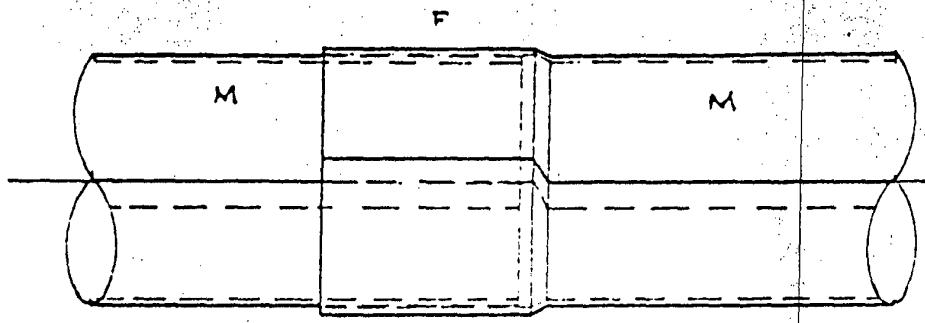

Fig.7

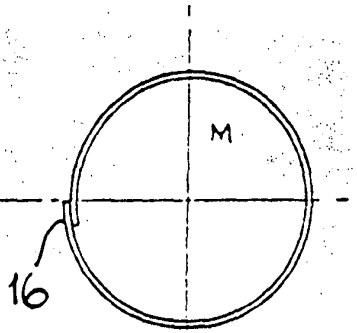

Fig.9

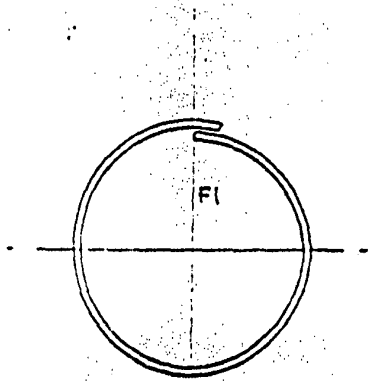

Fig.12

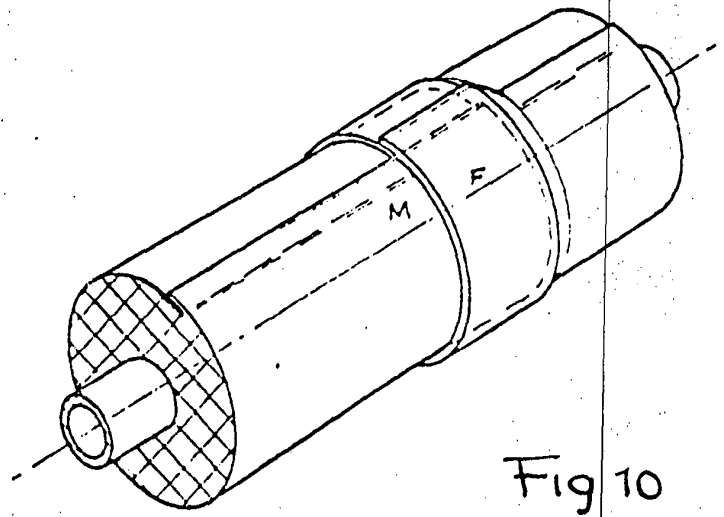

Fig 10

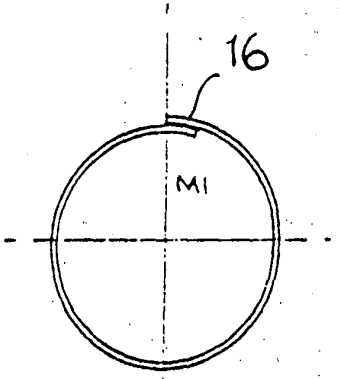

Fig 11

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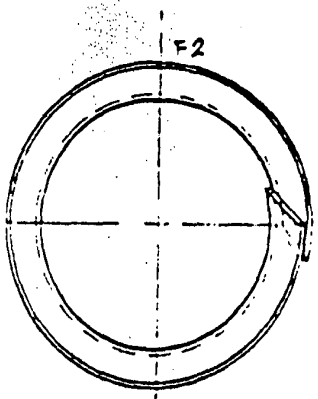

Fig 15

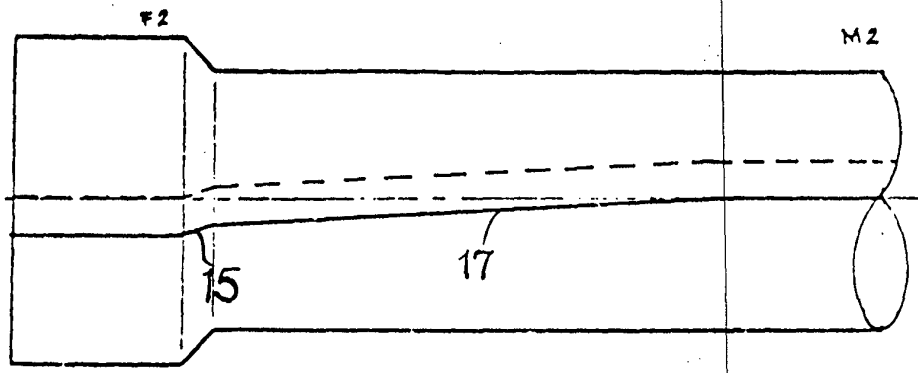

Fig 13

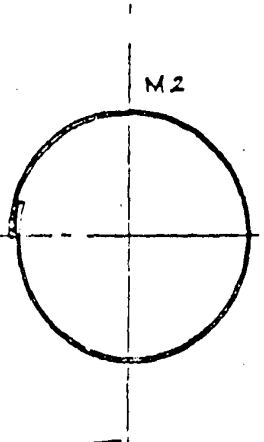

Fig 14

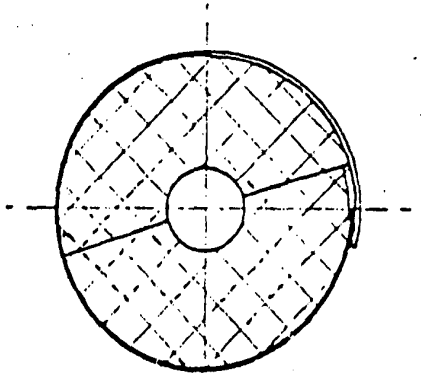

Fig 16

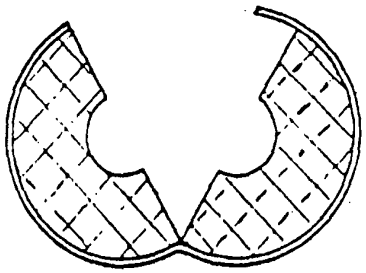

Fig 17

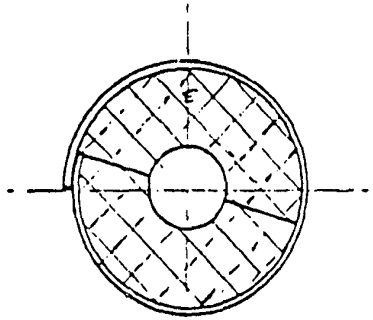

Fig 18

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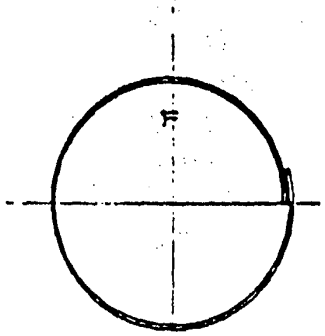


Fig 21

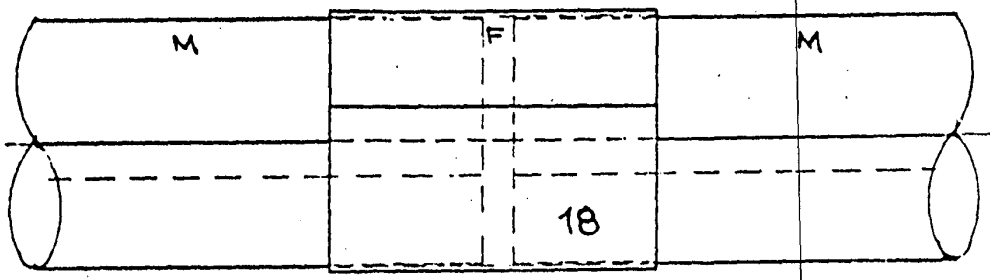


Fig 19

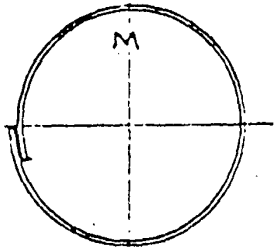


Fig 20

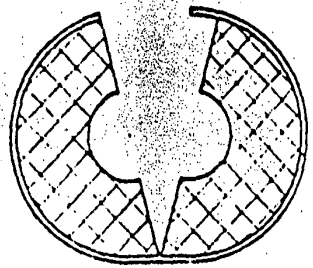


Fig. 24

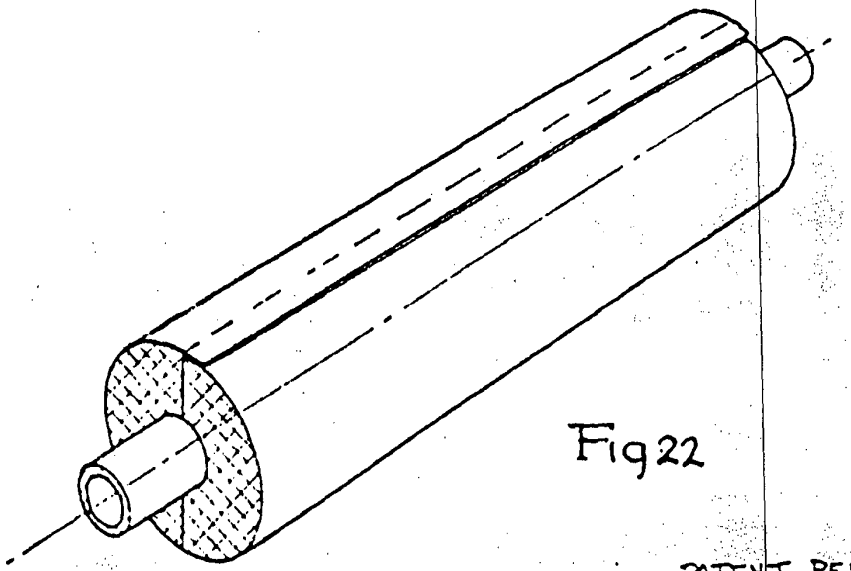


Fig 22

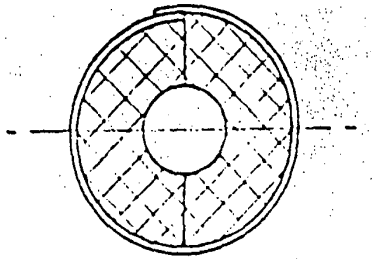


Fig 23

PATENT PENDING No PP 9246 4

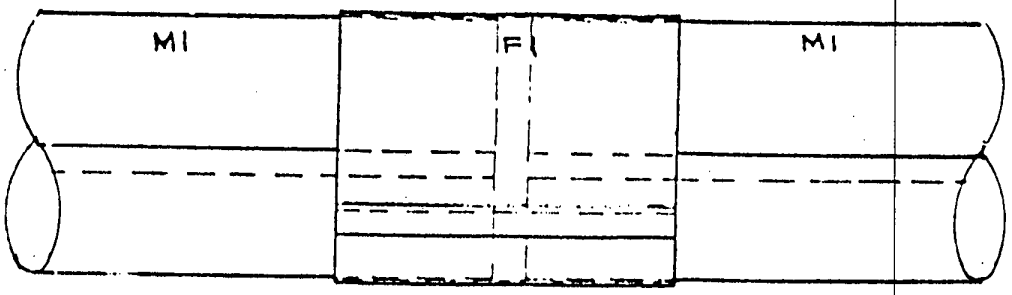


Fig 25

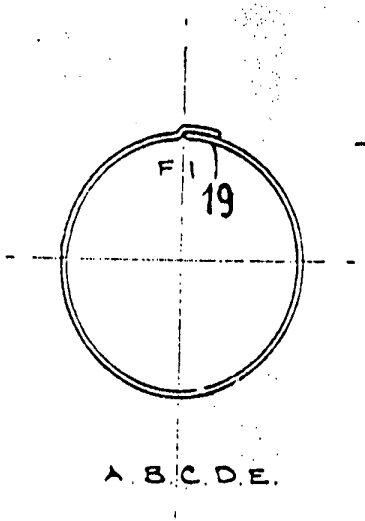


Fig 28

A. B. C. D. E.

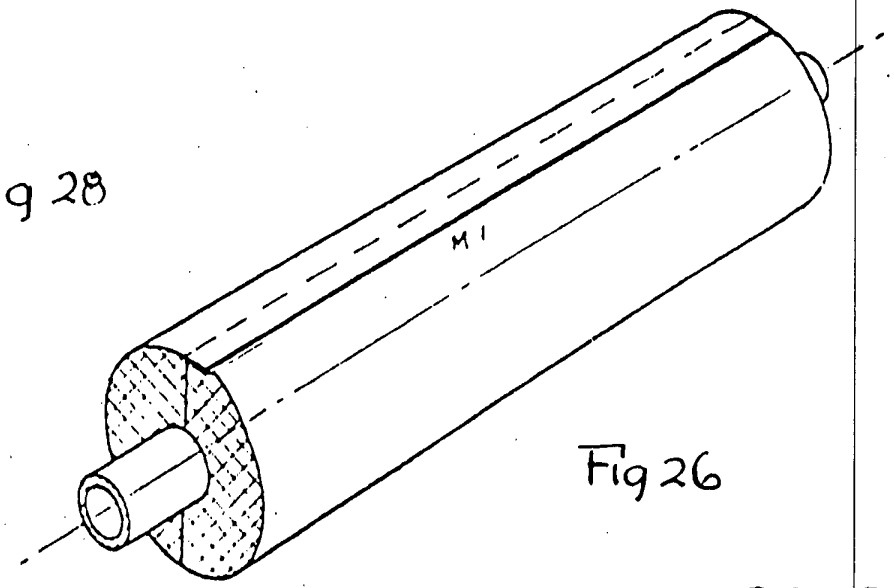


Fig 26

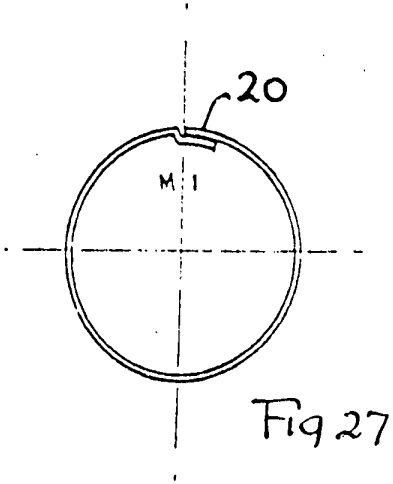


Fig 27

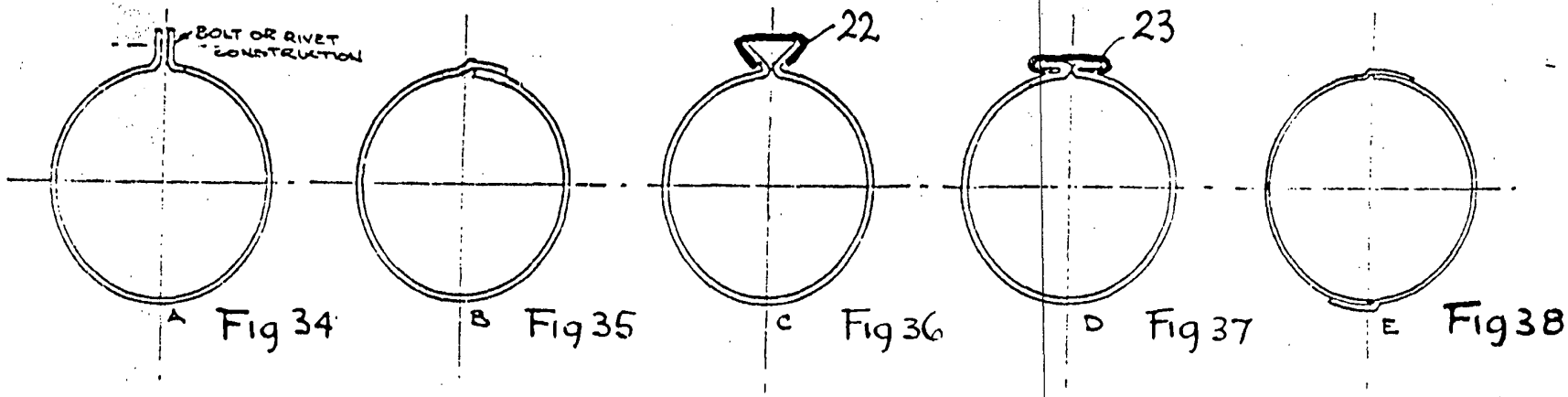


Fig 34 Fig 35 Fig 36 Fig 37 Fig 38

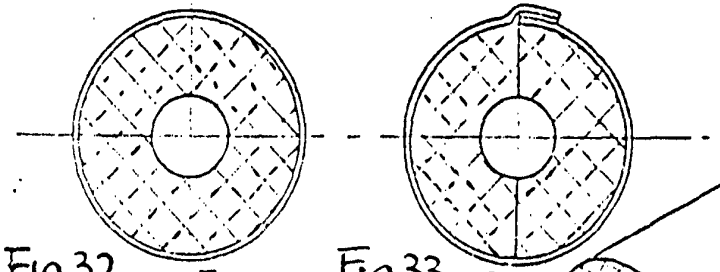


Fig 32 Fig 33

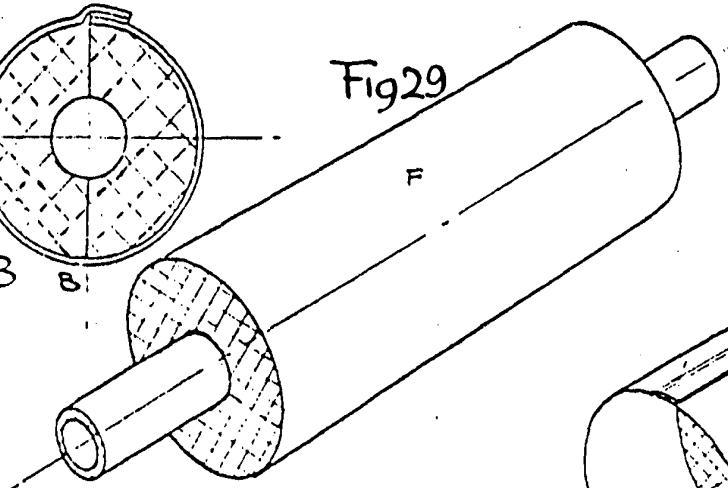


Fig29

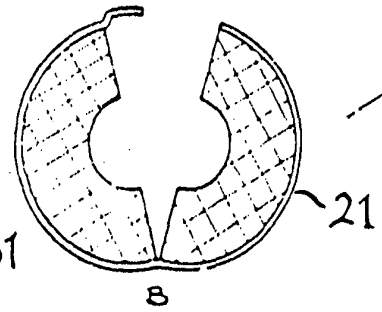


Fig 31

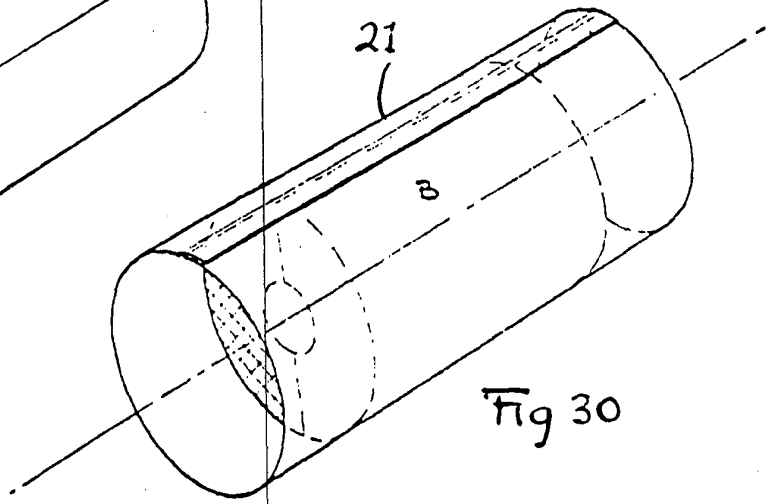


Fig 30

PATENT PENDING Nº PP 9246

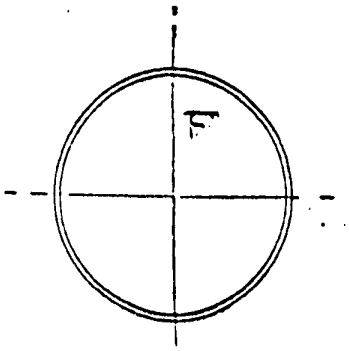


Fig 42

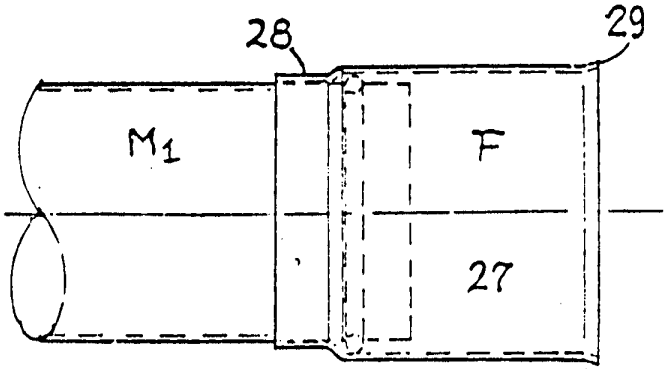


Fig 39

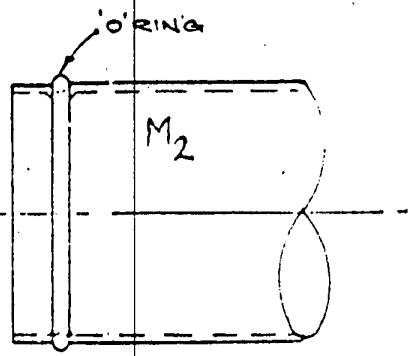


Fig 40

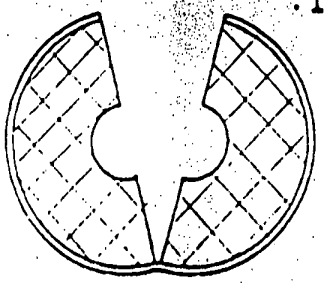


Fig 43

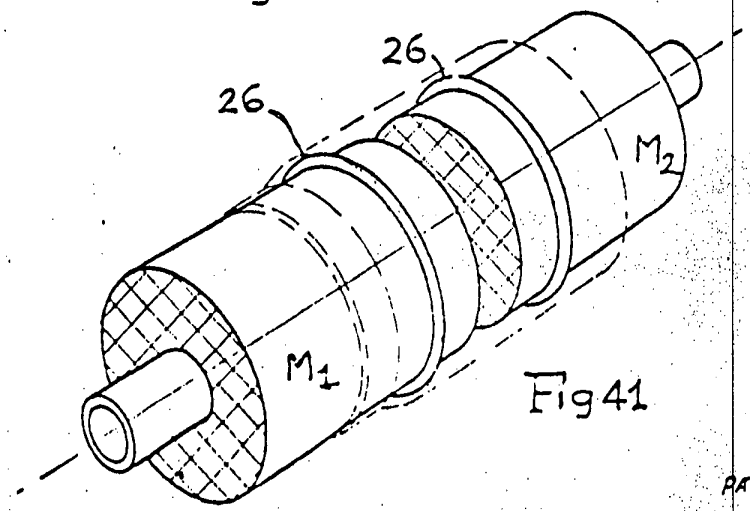


Fig 41

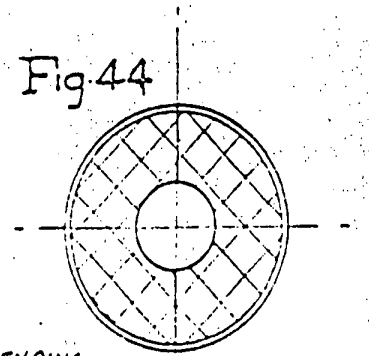


Fig 44

PATENT PENDING
No 9246

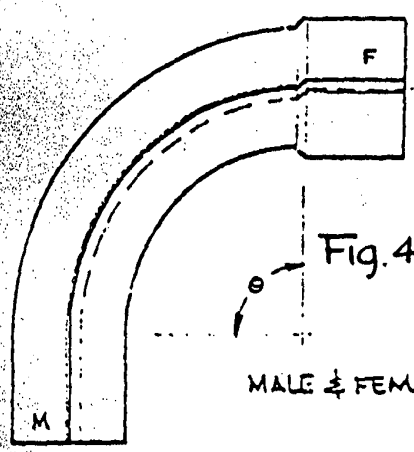


Fig. 45

MALE & FEMALE ELBOW

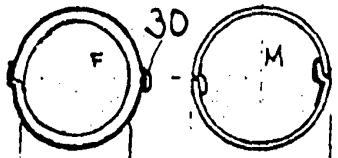
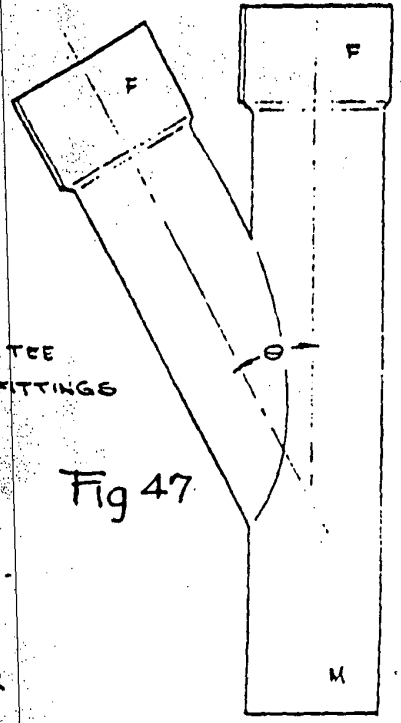


Fig 46 Fig 46a



'Y' & TEE FITTINGS

Fig 47

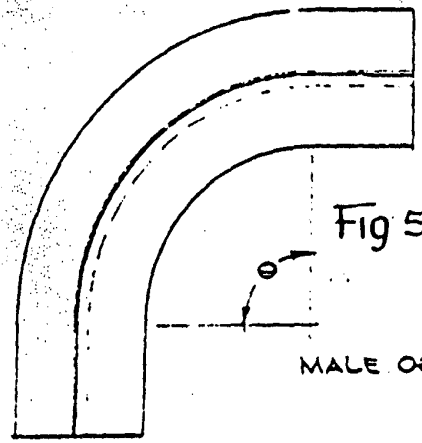
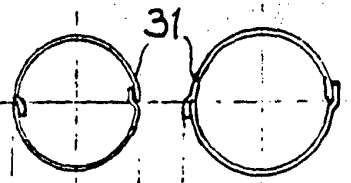


Fig 50

MALE OR FEMALE ELBOWS

ANGLE θ = 45°, 90°, OR AS REQ'D.



MALE SECTION Fig 51

FEMALE SECTION Fig 52

Fig 48

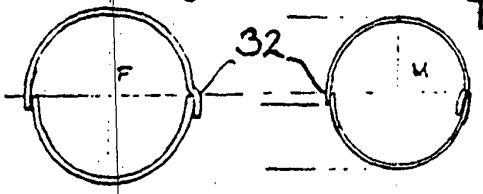


Fig 49

PATENT PENDING N° PP-9246

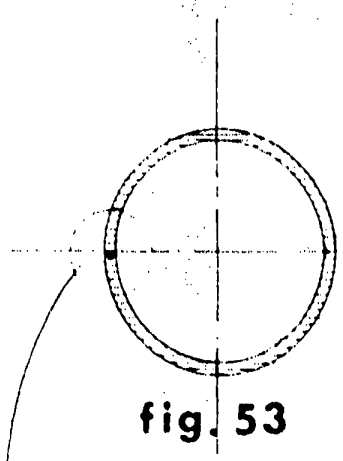


fig. 53

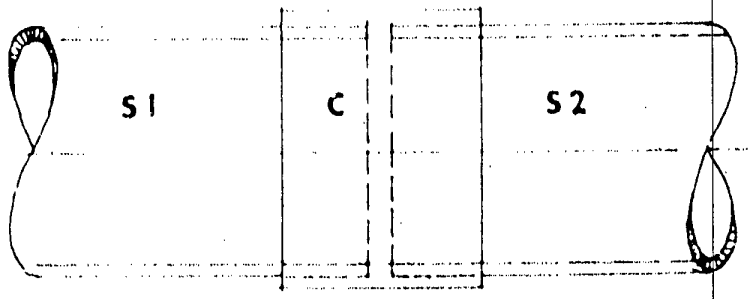


fig. 52

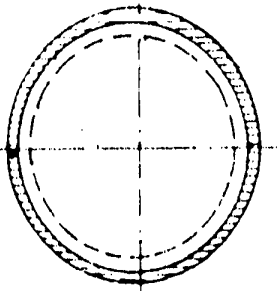


fig. 54

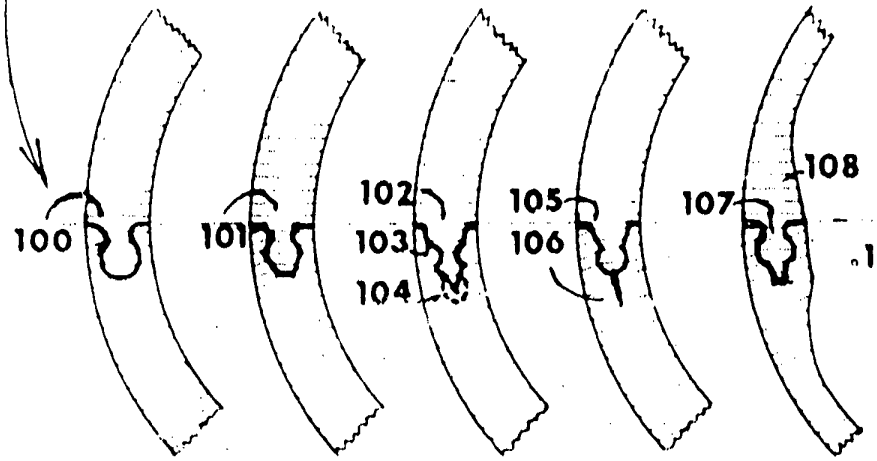


fig.55 fig.56 fig.57 fig.58 fig.59

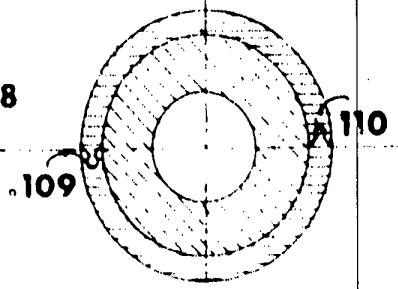


fig.60

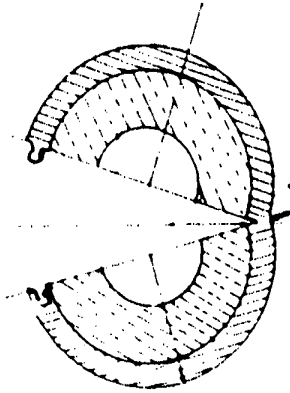
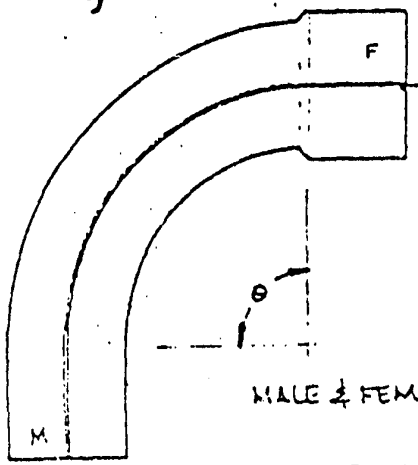


fig.61

Fig 62



MALE & FEMALE ELBOW

Fig 63

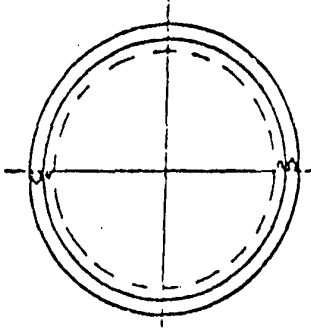
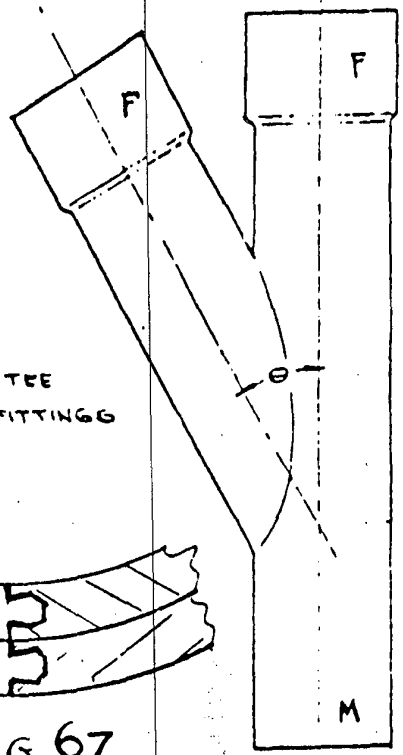
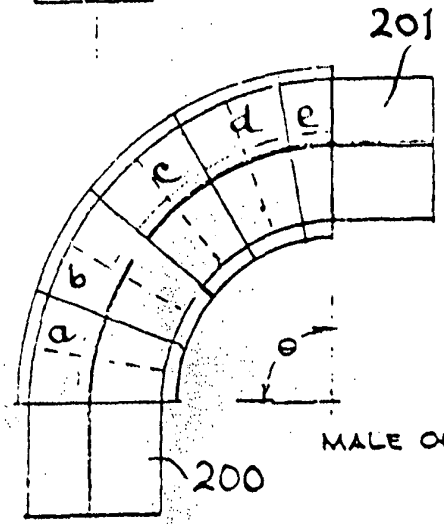


Fig 64



'Y' & TEE FITTINGS



MALE OR FEMALE ELBOWS

ANGLE θ = 45°, 90°, OR AS REQ'D.

Fig. 65

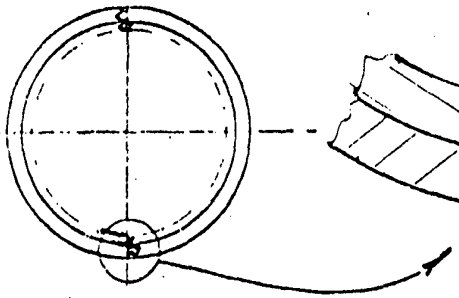


Fig 66

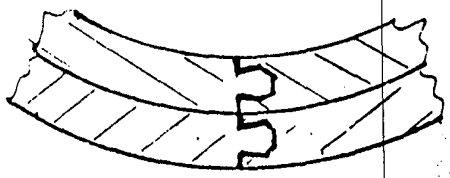


Fig 67

Fig 68

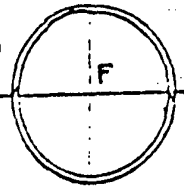
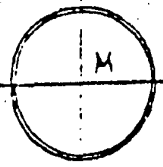


Fig 69



PATENT PENDING N° PP-9246